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INTRODUCED NATIVE FLORA AT THE SHAW ARBORETUM CONSTRUCTED WETLAND

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Franklin County, Missouri, is among the fastest growing counties in the state and the nation. The rapid development has had a predictably negative impact on the native vegetation. The Missouri Botanical Garden's 2400-acre Shaw Arboretum near Gray Summit is a notable exception to the county-wide trend in that there is an effort afoot to increase native plant and associated animal diversity on the site. The naturalist and horticultural staff of the Arboretum comb the surrounding countryside (usually less than 25 km from the Arboretum, 160 km maximum radius) for remnant populations of native plants, and staff and volunteers devote considerable time to harvesting their seeds (leaving some on site, of course). Collected seeds are divided into small quantities propagated for the Whitmire Wildflower Garden and larger quantities for ecological restoration in the Arboretum's wetland, glade, prairie, savanna and woodland. The Whitmire Garden is now home to over 500 Missouri natives, including labelled sedges and grasses, arrayed in naturalistic plantings. The Arboretum's premiere restoration project, the experimental prairie, has been so successful as to receive coverage in the form of several photographs in John Madsen and Frank Oberle's recent book, *Tallgrass Prairie* (1993, Falcon Press, Helena, MT), the only planted prairie so honored.

The purpose of this article is to introduce readers to Shaw Arboretum's latest habitat construction project, the wetland (Fig. 1). By making native plant enthusiasts aware of this constructed wetland early in its history, I hope to encourage them to observe and report the development of the wetland vegetation over time. The area consists of relatively flat land near the southern bank of Brush Creek, a small tributary of the Meramec River. The



Fig. 1. A portion of the wetland complex at the Shaw Arboretum.

area is underlain by a natural clay layer that was excavated to construct two berms, which trap surface runoff water totalling about 9.75 acres of water surface when full. The entire complex consists of the two adjacent ponds and about 8 acres of associated fields. Construction was supported by public and private funding.

Over half of the impounded water is shallow (60 cm or less), well-suited for emergent marsh plants. The fields are mostly wet-mesic (or potentially so), thus suited for development of sedge meadow and moist prairie vegetation. In the past, the whole area was cultivated, and drainage ditches remaining from that era still keep the fields drier than they will be when "fully restored". For several years before construction began in 1991, the fields where the wetland complex now lies were managed as fescue-orchard grass hay-fields, but a few low areas were wet enough in spring to support sedges and the breeding of amphibians in temporary pools.

A complete tabulation of plants that have been introduced to date in this wetland is given below, with nomenclature generally following Yatskievych and Turner's *Catalogue of the Flora of Missouri* (1990, Monogr. Syst. Bot. Missouri Bot. Gard. 37). Some species have been introduced from several sources and may arise from both purchased and locally collected accessions. Most species have been introduced as seed, and some have not yet been detected as growing plants. Many plant species occur spontaneously at the wetland, together with those listed below. Because this listing's purpose is ultimately to document the success of the introductions, the spontaneous flora is not listed.

Purchased material generally originated from non-local sources as potted or divided plant material. It was bought from Missouri Wildflowers Nursery (W) in Jefferson City, Missouri, or Kester Wildlife Gamefood Nursery (K) in Omro, Wisconsin. Some plants were collected under permit from Mingo National Wildlife Refuge (M) in southeastern Missouri by students of the Henry Shaw Academy of the Missouri Botanical Garden. Plants from these sources are a dominant feature of the submerged, floating, and emergent vegetation of the east pond, and comprise the first of the following lists. Seeds of most *Carex* species (in

a subsequent list) were purchased from Bluestem Prairie Nursery of Hillsboro, Illinois, and originated in Madison and Montgomery Counties in Illinois.

Dominant plants of the east pond
(introduced as cuttings or whole plants;
these may also occur on seed lists, below;
abbreviations as indicated above)

<i>Acorus americanus</i> (K)	<i>Nymphaea odorata</i> (three different clones from private ponds in northern Missouri)
<i>Alisma triviale</i> (K)	
<i>Ceratophyllum demersum</i> (K)	
<i>Eleocharis acicularis</i> (K)	<i>Pontederia cordata</i> (K, M)
<i>Elodea canadensis</i> (K)	<i>Sagittaria latifolia</i> (K, M)
<i>Hibiscus lasiocarpus</i> (M)	<i>Scirpus acutus</i> (K)
<i>Hydrolea uniflora</i> (M)	<i>Scirpus pungens</i> (K)
<i>Iris fulva</i> (W)	<i>Scirpus validus</i> (K)
<i>Iris virginica</i> var. <i>shrevei</i> (W)	<i>Sparganium eurycarpum</i> (K, M)
<i>Juncus effusus</i> (K)	<i>Taxodium distichum</i> (M; also from MO state nursery)
<i>Ludwigia peploides</i> (M)	<i>Vallisneria americana</i> (K)
<i>Nuphar lutea</i> (K)	

Shoreline
(introduced as seeds;
primarily along high water mark of west pond;
* indicates plants sown in shallow water,
all other species sown in moist soil
near water's edge and areas
inundated only after rain)

Graminoids

<i>Calamagrostis canadensis</i>	<i>Carex granularis</i>
<i>Carex annectens</i>	<i>Carex hyalinolepis</i>
<i>Carex bicknellii</i>	<i>Carex lacustris</i> *
<i>Carex buxbaumii</i>	<i>Carex lanuginosa</i>
<i>Carex crinita</i>	<i>Carex lupulina</i>
<i>Carex cristatella</i>	<i>Carex lurida</i>
<i>Carex crus-corvi</i>	<i>Carex molesta</i>
<i>Carex davisii</i>	<i>Carex praegracilis</i>
<i>Carex festucacea</i>	<i>Carex projecta</i>
<i>Carex frankii</i>	<i>Carex shortiana</i>

Shoreline Graminoids, Continued

<i>Carex squarrosa</i>	<i>Juncus brachycarpus</i>
<i>Carex stricta</i> *	<i>Juncus nodatus</i> *
<i>Carex suberecta</i>	<i>Leersia oryzoides</i> *
<i>Carex vulpinoidea</i>	<i>Panicum anceps</i>
<i>Cinna arundinacea</i>	<i>Scirpus georgianus</i> *
<i>Elymus canadensis</i>	<i>Scirpus pungens</i>
<i>Glyceria striata</i>	<i>Scirpus validus</i> *
<i>Juncus biflorus</i>	<i>Spartina pectinata</i>

Forbs

<i>Alisma triviale</i> *	<i>Lobelia siphilitica</i>
<i>Amsonia illustris</i>	<i>Ludwigia alternifolia</i>
<i>Bidens aristosa</i>	<i>Lycopus americanus</i>
<i>Bidens cernua</i>	<i>Penthorum sedoides</i>
<i>Boltonia asteroides</i>	<i>Sagittaria calycina</i>
<i>Chelone obliqua</i>	<i>Sagittaria latifolia</i> *
<i>Eupatorium perfoliatum</i>	<i>Scirpus pungens</i>
<i>Helenium autumnale</i>	<i>Scirpus validus</i> *
<i>Hibiscus laevis</i>	<i>Sium suave</i>
<i>Iris virginica</i>	<i>Sparganium eurycarpum</i> *
<i>Lobelia cardinalis</i>	<i>Verbena hastata</i>
	<i>Vernonia fasciculata</i>

**Wet meadow to south of
westernmost part of pond complex**
(introduced as seeds; abundant
Carex species and *Scirpus georgianus*
already present; exotic fescue sprayed;
area burned before sowing)

Graminoids

<i>Carex annectens</i>	<i>Carex lurida</i>
<i>Carex frankii</i>	<i>Carex shortiana</i>
	<i>Carex stricta</i>

Forbs

Agrimonia parviflora
Asclepias incarnata
Aster puniceus var. *firmus*
Chelone glabra
Desmanthus illinoensis
Eupatorium perfoliatum
Helenium autumnale
Iris virginica var. *shrevei*
Lobelia siphilitica

Lobelia cardinalis
Lysimachia quadriflora
Pedicularis lanceolata
Penstemon digitalis
Penthorum sedoides
Phlox maculata var. *pyramidalis*
Pycnanthemum virginianum
Rosa setigera
Rudbeckia fulgida
Solidago riddellii

Berms

(introduced as seeds;
initially seeded with *Lolium*
perenne for erosion control)

1. Top of berms, sunny sites

(* indicates plants sown on foot path)

Graminoids

Andropogon elliottii
Bouteloua curtipendula
*Bouteloua gracilis**
*Buchloe dactyloides**
Carex frankii
Elymus canadensis

Eragrostis trichodes
*Juncus tenuis**
Muhlenbergia schreberi
Panicum anceps
Schizachyrium scoparium
Sorghastrum nutans
Sporobolus heterolepis

Forbs

Agalinis tenuifolia
Allium stellatum
Amorpha canescens
Asclepias verticillata
Aster novae-angliae
Aster oblongifolius
Baptisia alba
Baptisia australis
Castilleja coccinea
Chamaecrista fasciculata

Chrysopsis villosa
Coreopsis palmata
Coreopsis lanceolata
Dalea purpurea
Desmanthus illinoensis
Dodecatheon meadia
Echinacea simulata
Helianthus mollis
Heliopsis helianthoides
Hieracium gronovii

Tops of Berms, Forbs, continued

<i>Hypericum sphaerocarpum</i>	<i>Rudbeckia hirta</i>
<i>Lespedeza virginica</i>	<i>Rudbeckia missouriensis</i>
<i>Liatris aspera</i>	<i>Rudbeckia triloba</i>
<i>Liatris cylindracea</i>	<i>Sabatia angularis</i>
<i>Lobelia siphilitica</i>	<i>Salvia azurea</i>
<i>Monarda fistulosa</i> <i>Monarda punctata</i>	<i>Silene regia</i>
<i>Pedicularis canadensis</i>	<i>Silphium terebinthinaceum</i>
<i>Penstemon pallidus</i>	<i>Silphium integrifolium</i>
<i>Physostegia virginiana</i>	<i>Strophostyles helvula</i>
<i>Ratibida pinnata</i>	<i>Tephrosia virginiana</i>
	<i>Veronicastrum virginicum</i>

2. Spillways

Graminoids

<i>Elymus canadensis</i>	<i>Juncus biflorus</i>
<i>Elymus virginicus</i>	<i>Panicum anceps</i>
var. <i>glabriflorus</i>	<i>Spartina pectinata</i>

Forbs

<i>Baptisia alba</i>	<i>Lobelia cardinalis</i>
<i>Bidens aristosa</i>	<i>Lycopus americanus</i>
<i>Boltonia asteroides</i>	<i>Penstemon digitalis</i>
<i>Chelone obliqua</i>	<i>Ratibida pinnata</i>
<i>Coreopsis tripteris</i>	<i>Silphium perfoliatum</i>
<i>Eupatorium perfoliatum</i>	<i>Sium suave</i>
<i>Helenium autumnale</i>	<i>Verbena hastata</i>
<i>Iris virginica</i>	<i>Verbesina alternifolia</i>
var. <i>shrevei</i>	<i>Vernonia fasciculata</i>

3. Shady areas of west berm

(* indicates creepers, sown to
clamber over brush piles)

Graminoids

Brachyelytrum erectum
Bromus pubescens
Chasmanthium latifolium

Diarrhena americana
Elymus virginicus
 var. *glabriflorus*
Glyceria striata

Forbs

Agastache nepetoides
Allium cernuum
*Ampelopsis cordata**
Anemone virginiana
Blephilia ciliata
Campanula americana
*Clematis crispa**
*Clematis virginiana**
*Cynanchum laeve**

Dasistoma macrophylla
*Dioscorea villosa**
Echinacea purpurea
Eupatorium purpureum
Helianthus hirsutus
Heliopsis helianthoides
Rudbeckia triloba
Verbesina helianthoides
*Vitis riparia**

Wet woodland

(introduced as seeds;
 swampy woods near raised boardwalk;
 * indicates transplants)

Carex lupulina
Cinna arundinacea
Decodon verticillatus
Gentiana andrewsii
Glyceria striata
*Iris fulva**
*Liquidambar styraciflua**

Lobelia cardinalis
Quercus pagoda (from Missouri
 state nursery)*
Quercus phellos (from Missouri
 state nursery)*
*Saururus cernuus**
Verbesina alternifolia

Prairie

(introduced as seeds;
 mesic to moist uplands adjacent to
 wetland trail; species sown according to
 moisture preferences)

Graminoids

Andropogon gerardii
Bouteloua curtipendula

Calamagrostis canadensis
Carex complanata

Prairie Graminoids, Continued

<i>Elymus canadensis</i>	<i>Schizachyrium scoparium</i>
<i>Elymus virginicus</i>	<i>Sorghastrum nutans</i>
var. <i>glabriflorus</i>	<i>Sporobolus heterolepis</i>
<i>Juncus</i> sp.	<i>Sporobolus asper</i>
<i>Koeleria pyramidata</i>	<i>Sporobolus heterolepis</i>
<i>Panicum virgatum</i>	<i>Tridens strictus</i>
	<i>Tripsacum dactyloides</i>

Forbs

<i>Agalinis tenuifolia</i>	<i>Hypericum punctatum</i>
<i>Amorpha canescens</i>	<i>Lespedeza capitata</i>
<i>Asclepias incarnata</i>	<i>Liatris aspera</i>
<i>Asclepias sullivantii</i>	<i>Liatris pycnostachya</i>
<i>Asclepias tuberosa</i>	<i>Liatris scariosa</i>
<i>Aster laevis</i>	<i>Monarda fistulosa</i>
<i>Aster novae-angliae</i>	<i>Oenothera pilosella</i>
<i>Aster praealtus</i>	<i>Parthenium integrifolium</i>
<i>Aster sericeus</i>	<i>Penstemon digitalis</i>
<i>Baptisia alba</i>	<i>Phlox glaberrima</i>
<i>Baptisia bracteata</i>	<i>Phlox pilosa</i>
<i>Boltonia asteroides</i>	<i>Pycnanthemum pilosum</i>
<i>Camassia scilloides</i>	<i>Ratibida pinnata</i>
<i>Castilleja coccinea</i>	<i>Rudbeckia hirta</i>
<i>Chelone obliqua</i>	<i>Rudbeckia subtomentosa</i>
<i>Coreopsis palmata</i>	<i>Sabatia angularis</i>
<i>Coreopsis tripteris</i>	<i>Salvia azurea</i>
<i>Dalea candida</i>	<i>Senna marilandica</i>
<i>Dalea purpurea</i>	<i>Silene regia</i>
<i>Dodecatheon meadia</i>	<i>Silphium integrifolium</i>
<i>Echinacea purpurea</i>	<i>Silphium laciniatum</i>
<i>Echinacea simulata</i>	<i>Silphium perfoliatum</i>
<i>Erythronium mesochoreum</i>	<i>Silphium terebinthinaceum</i>
<i>Eupatorium coelestinum</i>	<i>Solidago rigida</i>
<i>Gaura biennis</i>	<i>Solidago speciosa</i>
<i>Gentiana andrewsii</i>	<i>Tradescantia ohiensis</i>
<i>Gentiana puberulenta</i>	<i>Verbena hastata</i>
<i>Helenium autumnale</i>	<i>Verbesina alternifolia</i>
<i>Helianthus mollis</i>	<i>Verbesina helianthoides</i>
<i>Helianthus grosseserratus</i>	<i>Veronicastrum virginicum</i>
<i>Heliopsis helianthoides</i>	<i>Zizia aurea</i>

PLANTS OF
THE JAMERSON C. McCORMACK
CONSERVATION AREA, HOLT COUNTY,
MISSOURI

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Formed over a ten thousand year period by wind deposits of fine sediment, the loess hills landform is disjunctively spread over Iowa, Nebraska, and Missouri along the Missouri River (Prior, 1976). The highly angular loess soil particles of pleistocene origin erode to produce unworkable exposed areas with high evaporation rates leading to low water penetration (Novacek, 1985). Ironically, these austere agricultural conditions have resulted in a fairly well preserved natural vegetation, although the overall acreage in Missouri is low. For these reasons, many native species of the hills have been saved from the effects of human activities (Farrar et al., 1985). In general, as with all prairie-like communities, plowing, over-grazing, and fire control appear to be the main causes of prairie destruction (Schroeder, 1982). At present, the greatest danger to natural vegetation of this landform appears to be fire prevention and consequent woody species invasions (Kucera and Koelling, 1964; Bragg and Hulbert, 1976). Comprehensive descriptions of the Loess Hills land form are available in Farrar et al. (1985), Heineman (1982), Mutel (1986), and Roosa et. al. (1986).

The Missouri loess hill prairies contain several state-listed species. The Jamerson C. McCormack Conservation Area, for example, is known to possess several species, such as, *Astragalus lotiflorus*, *Castilleja sessiliflora*, *Dalea enneandra*, and *Lygodesmia juncea* (Missouri Department of Conservation,

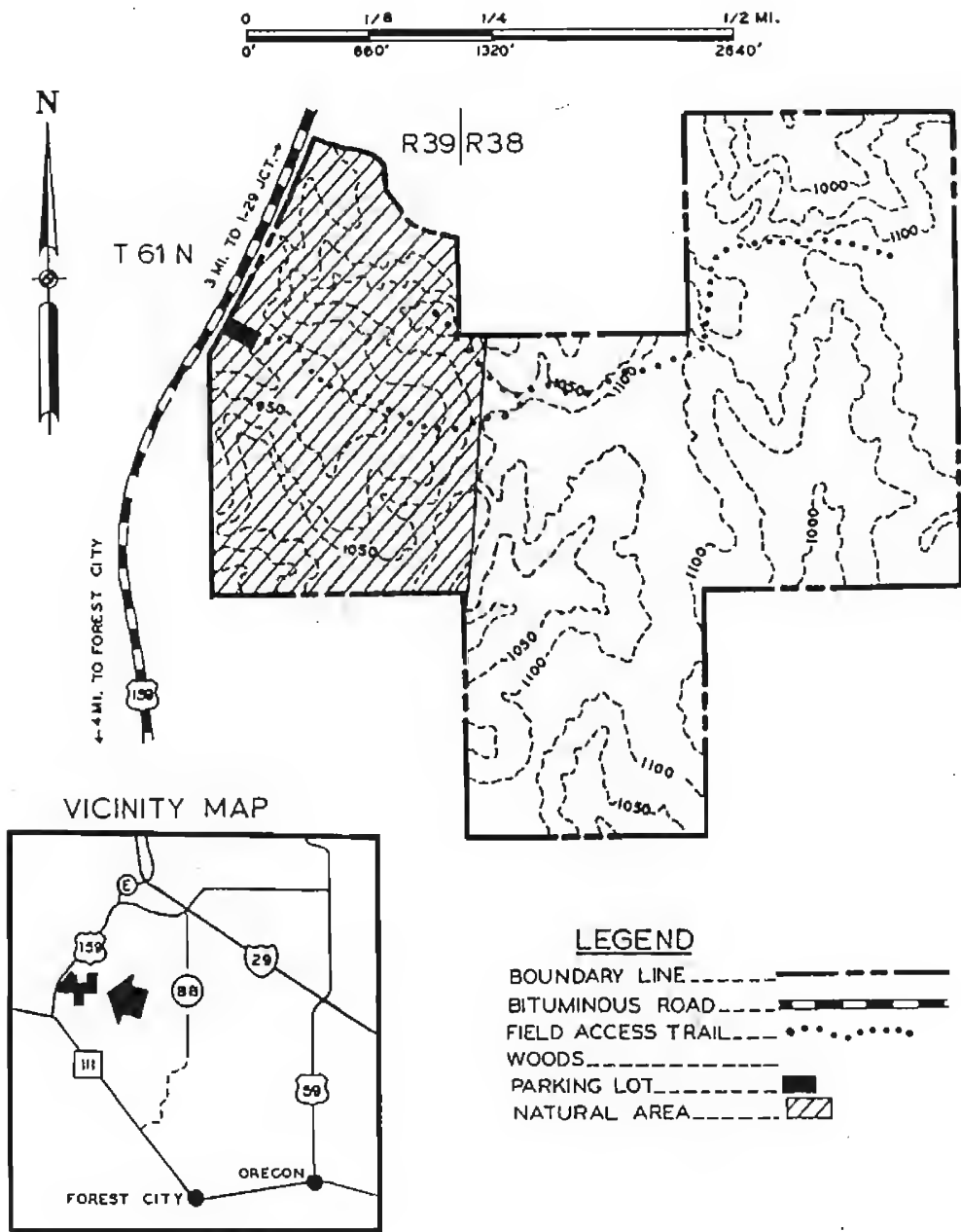


Fig. 1. Map of Jamerson C. McCormack Conservation Area. Missouri Department of Conservation property is in the striped portion, the remainder is property of The Nature Conservancy. The map is courtesy of the Missouri Department of Conservation.

1994). Loess areas also are known for their specialized hill prairies, which occur mostly on the exposed tops and along the slopes throughout the loess hills. These prairies are often dominated by *Schizachyrium scoparium*, and *Bouteloua curtipendula* (Novacek, 1985). Other shortgrass components include *B. hirsuta*, and *B. gracilis*, whereas tallgrass components include *Andropogon gerardii* and *Sorghastrum nutans* (Novacek et al., 1985). According to Great Plains Flora Editorial Committee (1986) and Iffrig (1980), Atchison and Holt Counties provide Missouri with its only true mixed grass prairie.

Novacek et al. (1985) reported 703 species (358 genera in 97 families) in loess hills counties from South Dakota to Atchison and Holt Counties in Missouri. They reported 427 species in Holt County. Members of the Asteraceae, Poaceae, and the Fabaceae were most common.

THE STUDY AREA

The Jamerson C. McCormack Conservation Area (Fig. 1), Holt County, Missouri, is a 92 hectare (227 acres) site of loess hills in the northwestern corner of the state. Located within section 36 of T61N R39W and section 31 of T61N R38W, the area is jointly owned by the Missouri Department of Conservation (MDC) and The Nature Conservancy (TNC), and lies at the southern end of the loess hills landform (Novacek et al., 1985).

Holt County receives about 92 cm (36.8 in.) of rain annually. Wide fluctuations in climate are usual. Most of the rain falls during spring and summer, with maximums in May (13.3 cm) and September (14.0 cm). February, the driest month, has an average of only 2.9 cm. Mean daily temperatures are warmest in July (25.5°C), and the lowest temperatures occur in January, with a mean of -5°C (USDA Soil Conservation Service, 1982).

According to records at the Holt County Abstract Office, the area was originally subdivided early in the 1850's. Many changes in ownership occurred until 1966, when Jamerson C. McCormack purchased much of the land (B. Richards, Holt County Abstracts Office, personal communication). He donated approximately two-thirds of the present area to the Nature Con-

servancy in 1968. The remainder was donated to the Missouri Department of Conservation by Jamerson and S. Carson McCormack in 1976.

The area possesses both prairie and forest communities. Nelson (1985) observed that *S. scoparium* and *B. hirsuta* were the prairie's dominant grasses, whereas *Quercus alba*, *Q. rubra*, *Carya ovata*, and *Acer saccharinum* were the dominant forest trees. Novacek et al. (1985) listed 32 tree species for the loess hills of Holt County. These occur principally on the somewhat cooler, moister north and east slopes. In the case of the McCormack area, the much disturbed forest occurs on lower sites, whereas a less disturbed upland forest occurs on the north slopes. These forest communities might possibly be classified as dry-mesic (Nelson, 1985). Management efforts undertaken by MDC have been carried out with emphasis on protecting sensitive prairie plants on the Missouri list (Missouri Department of Conservation, 1994). Limited vegetational studies within the area have been made, but a thorough species list of the vascular flora has not been compiled. The primary aims of the present study are to provide a species list for the area and to determine the relative dominances of species in the MDC and TNC prairies.

STUDY METHODS

To compile a baseline species list, plants were collected during two growing seasons, from May, 1986 to the end of October, 1987. Collections were made twice monthly by searching lowland woods, upland woods, prairie and ruderal areas. Within these habitats various unusual features, such as openings of wooded areas, were especially searched. Plants were identified by both authors and ultimately verified by the senior author. All specimens are deposited in the herbarium at Central Missouri State University (WARM) in Warrensburg, Missouri.

During September, 1987, transect lines were run through a representative upland forest in the area. A crown line-intercept technique was used to determine density and dominance of woody plants (Cox, 1980). All woody plants over 2.5 cm dbh were included in the survey. For future comparison, modified

importance values were determined for each species. The more disturbed lowland forest community was only searched visually, with important species recorded.

Prairie sites cover approximately 4.0 hectare and occur both in MDC and TNC parcels. In the summer of 1987, randomly dispersed 1×2 meter plots in the two prairie areas (ten plots on MDC land and five plots on TNC land) were selected. The Braun-Blanquet cover estimation method was used to estimate dominance by cover (Mueller-Dombois and Ellenberg, 1974).

THE FOREST COMMUNITY

The lowland forest occupies approximately 2.8 hectares. The primary canopy is dominated by *Tilia americana*, *Populus deltoides*, and *Juglans nigra*. The subcanopy layer consists largely of *Asimina triloba* and *Cercis canadensis*, with scattered *Fraxinus americana* and *F. pennsylvanica*. Liana formers are *Parthenocissus quinquefolia* and *Vitis vulpina*. The shrub layer is composed of *Ribes missouriensis* and *Symphoricarpos orbiculatus*. The ground layer contains *Erythronium albidum*, *Dicentra cucullaria*, *Podophyllum peltatum*, *Bromus inermis*, *Tradescantia ohiensis*, *Commelina communis*, *Polygonatum virginianum*, *Urtica dioica*, *Ellisia nyctelea*, *Pilea pumila*, *Phlox paniculata*, *Eupatorium purpureum*, *E. rugosum*, and *Solidago altissima*.

The upland forest occupies about 73 hectares and is relatively diverse. Twenty-two tree species were found and their importance values determined (Table 1). Importance value of a species is a relative indicator of its overall ecological position in a forest community [IV has an absolute community maximum of 300 and is calculated by adding the relative dominance, relative frequency, and relative density of the species]. No single tree species is clearly dominant. The three species with the highest importance values are *Cornus drummondii* (51), *Ulmus rubra* (35), and *Fraxinus americana* (31). Some major canopy species are *Juglans nigra* (11), *Quercus macrocarpa* (15), *Celtis occidentalis* (6), *Ostrya virginiana* (15) and *Q. rubra* (3.5). These data indicate a forest still in early successional development. Roosa et al. (1986) found dramatic increases in *Cornus drummondii* and *Rhus glabra* populations as woody species invaded loess

areas. The three dominant species, *Cornus drummondii*, *Ulmus rubra*, and *Fraxinus americana*, have been observed in Johnson county, Missouri, as aggressive invaders of abandoned fields and open woodlands. The presence of more climax associated trees, such as *Quercus macrocarpa*, *Q. rubra*, *Juglans nigra*, *Carya cordiformis*, and *C. ovata*, among the more weedy dominants in lower relative densities indicate these are survivors from an older succession. We should expect larger importance values for

Table 1. Importance values of an upland forest community at the Jamerson C. McCormack Conservation Area, Holt County, Missouri, Autumn 1986.

	relative frequency	relative density	relative dominance	importance value
<i>Cornus drummondii</i>	18.6	22.0	10.8	51.4
<i>Ulmus rubra</i>	13.4	11.2	10.9	35.5
<i>Fraxinus americana</i>	9.4	13.3	7.9	30.6
<i>Cercis canadensis</i>	7.1	8.0	4.8	19.9
<i>Ulmus americana</i>	6.3	5.1	5.6	17.0
<i>Asimina triloba</i>	3.1	8.3	5.1	16.5
<i>Ulmus pumila</i>	3.7	6.5	4.8	15.0
<i>Ostrya virginiana</i>	5.0	4.5	5.4	14.9
<i>Quercus macrocarpa</i>	3.3	1.6	9.7	14.6
<i>Robinia pseudo-acacia</i>	3.1	3.5	7.3	13.9
<i>Quercus rubra</i>	5.6	2.5	4.0	12.1
<i>Morus rubra</i>	3.4	2.2	5.5	11.1
<i>Juglans nigra</i>	3.7	2.5	4.7	10.9
<i>Fraxinus pennsylvanica</i>	2.9	1.5	3.3	7.7
<i>Celtis occidentalis</i>	3.0	2.4	1.0	6.4
<i>Acer negundo</i>	1.5	1.1	2.0	4.6
<i>Tilia americana</i>	0.9	0.8	2.7	4.4
<i>Gleditsia triacanthos</i>	2.5	1.1	0.7	4.3
<i>Juniperus virginiana</i>	1.7	0.8	0.3	2.8
<i>Populus deltoides</i>	0.2	0.2	2.3	2.7
<i>Maclura pomifera</i>	0.7	0.5	0.5	1.7
<i>Carya cordiformis</i>	0.4	0.2	0.4	1.0
<i>Carya ovata</i>	0.2	0.1	0.2	0.5
<i>Morus alba</i>	0.3	0.1	0.1	0.5
Totals	100	100	100	300

these climax associated trees as the community ages. Heineman (1982) suggested this may take as long as 80 years in the central Loess hills of Iowa.

Subcanopy species consist mainly of *Cornus drummondii*, *Celtis canadensis*, and *Ulmus rubra*. The shrub layer is composed of *Symphoricarpos orbiculatus* and *Ribes missouriensis*. Woody vines are *Smilax hispida*, *Vitis riparia*, *V. vulpina*, *Parthenocissus quinquefolia*, *Celastrus scandens*, and *Sicyos angulatus*. Two ferns, *Botrychium virginianum* and *Adiantum pedatum*, were also found.

THE PRAIRIE COMMUNITY

Few prairie plants flowered until well into spring. Early bloomers are *Viola pratincola*, *Salix humilus*, *Castilleja sessiliflora*, *Astragalus crassicaarpus*, *A. lotiflorus*, *Ceanothus herbaceus*, and *Sisyrinchium campestræ*. Later in spring, *Comandra umbellata*, *Delphinium carolinianum*, *Anemone cylindrica*, and *Senecio plattensis* flower. Summer flowering species include the warm season grasses, such as, *Panicum capillare*, *Muhlenbergia cuspidata*, and *Bouteloua hirsuta*, as well as late summer composites, such as *Vernonia baldwinii*, *Kuhnia eupatorioides*, *Eupatorium rugosum*, *Liatris aspera*, *L. punctata*, *Aster oolentangiensis*, *A. sericeus*, and several *Solidago* species. Although autumn flowering is limited almost exclusively to grasses and composites, other species, such as, *Spiranthes cernua*, *Lespedeza capitata*, and *Hedyotis nigricans* were observed. By November, all flowering had ceased.

A total of 38 species was found in the sample plots of the MDC prairie parcel. *Sorghastrum nutans* was the dominant species, occurring in 9 of 10 sample plots, with an average cover of 37.7 percent. Next in occurrence and cover were *Andropogon gerardii* (6 plots, 9.5 percent), *Amorpha canescens* (6 plots, 7.7 percent), *Schizachyrium scoparium* (7 plots, 5.8 percent), and *Bouteloua curtipendula* (9 plots, 5.5 percent). Many woody species, such as *Rhus glabra*, *Cornus drummondii*, *Quercus macrocarpa*, and *Ostrya virginiana*, were found in the prairie area. No herbaceous weedy species, other than *Erigeron*

annuus, was found in the plots. Approximately 19 percent of the plots' surfaces was open (exposed) (Table 2).

A total of 14 species was found in the sample plots on the TNC prairie parcel. *Melilotus* spp. (principally *M. officinale*) were dominant, with occurrences in 6 of 6 plots and with an average cover of 19 percent. Next were *Bouteloua curtipendula* (4 plots, 18.3 percent), *Andropogon gerardii* (4 plots, 16 percent), *Schizachyrium scoparium* (6 plots, 15.1 percent), and *Sorghastrum nutans* (5 plots, 13.4 percent). Two woody species, *Quercus rubra* and *Rhus glabra*, were found encroaching into the prairie. Again as in the MDC plots, no herbaceous, weedy species, other than *Melilotus* spp. was found in the plots. Approximately 9.6 percent of the sample plots' surface was open (Table 3).

When compared, the sample plots of the MDC and TNC prairies appear at first to be somewhat different. The MDC prairie had 38 species in the sample plots, whereas the TNC prairie had only 14 species. The MDC prairie was dominated by *Sorghastrum nutans* and *A. gerardii*, but the TNC prairie appeared dominated by an atypical dominant, *Melilotus officinale*. However, its high cover percentage comes from only two sample plots. Therefore, if *M. officinalis* were to be ignored, the TNC prairie then becomes much like the MDC prairie, being dominated by more typical species, *Bouteloua curtipendula*, *Andropogon gerardii*, and *Schizachyrium scoparium*.

THE SPECIES LIST

A total of 275 taxa representing 268 species in 73 genera was found in all communities of the conservation area (see Appendix). Species names are those of Yatskievych and Turner (1990).

The Asteraceae were most diverse, with 43 species, followed by the Poaceae (30 species), and the Fabaceae (20 species). These three families are also the most common families of the loess hills (Novacek et al., 1985).

Table 2. A list of species and their cover percentages obtained from ten randomly selected sample plots on Missouri Department of Conservation prairie parcels at the Jamerson C. McCormack Conservation Area, Holt County, Missouri, 1987.

tr = less than 1 percent cover

	Plot Number										FREQ	AVG
	1	2	3	4	5	6	7	8	9	10		
<i>Ambrosia psilostachya</i>	-	1	-	-	-	2	tr	tr	2	3	6	0.8
<i>Amorpha canescens</i>	20	-	10	5	18	-	-	12	-	-	6	7.7
<i>Andropogon gerardii</i>	10	-	-	-	-	9	50	20	-	3	6	9.5
<i>Asclepias verticillata</i>	-	-	-	-	-	-	tr	-	-	-	1	tr
<i>Aster prealtus</i>	-	-	-	-	-	tr	-	-	-	-	1	tr
<i>Aster sericeus</i>	-	-	-	-	-	-	1	-	-	-	1	0.1
<i>Aster oolentangiensis</i>	-	-	2	-	-	-	-	-	-	-	1	0.2
<i>Aster ericoides</i>	-	-	-	2	-	-	-	-	-	-	1	0.2
<i>Bouteloua hirsuta</i>	3	-	-	-	-	-	-	-	-	-	1	0.3
<i>Bouteloua curtipendula</i>	5	5	15	2	9	-	2	tr	10	7	9	5.5
<i>Calylophus serrulatus</i>	-	-	-	-	-	-	-	-	-	tr	1	tr
<i>Ceanothus herbaceus</i>	-	-	-	10	5	-	-	-	1	-	3	1.6
<i>Celastrus scandens</i>	-	-	-	-	-	-	-	-	1	-	1	0.1
<i>Comandra umbellata</i>	-	-	-	2	-	-	-	-	-	-	1	0.2
<i>Cornus drummondii</i>	-	-	-	-	2	3	4	2	-	-	4	1.1
<i>Dalea purpurea</i>	-	-	1	tr	-	-	-	-	-	-	2	0.1
<i>Dalea enneandra</i>	-	5	-	tr	-	-	-	-	-	-	2	0.4
<i>Dichanthelium acuminatum</i>	-	3	-	-	tr	tr	-	-	-	-	3	0.3
<i>Erigeron annuus</i>	-	-	-	-	-	-	1	-	-	-	1	0.1
<i>Euphorbia corollata</i>	-	-	-	-	-	2	-	-	-	-	1	0.2
<i>Euphorbia dentata</i>	2	-	-	-	-	-	-	-	-	-	1	0.2
<i>Hedyotis nigricans</i>	-	-	-	-	-	-	-	-	-	1	1	0.1
<i>Lespedeza capitata</i>	2	-	-	-	-	-	-	-	-	1	2	0.3
<i>Liatris punctata</i>	8	-	10	-	-	-	-	-	1	-	3	1.9
<i>Liatris aspera</i>	-	-	-	-	-	1	-	-	-	-	1	0.1
<i>Melilotus officinale</i>	tr	-	-	-	-	-	-	-	-	-	1	tr
<i>Ostrya virginiana</i>	-	-	-	-	-	-	-	1	-	-	1	0.1
<i>Quercus macrocarpa</i>	-	-	tr	4	-	-	-	-	-	-	2	0.3
<i>Rhus glabra</i>	-	-	35	-	-	-	-	-	-	10	2	4.5
<i>Robinia pseudoacacia</i>	-	-	tr	-	-	-	-	-	-	-	1	tr
<i>Salix humilis</i>	tr	-	-	-	-	-	-	-	-	-	1	tr
<i>Schizachyrium scoparium</i>	20	17	-	2	5	-	2	2	-	10	7	5.8
<i>Sisyrinchium campestre</i>	tr	-	-	-	-	-	-	-	-	-	1	tr
<i>Solidago rigida</i>	-	-	-	-	2	-	-	-	-	-	1	0.2
<i>Sorghastrum nutans</i>	-	14	4	60	38	15	50	60	50	50	9	37.7
<i>Symphoricarpos orbiculatus</i>	-	-	-	-	-	-	tr	-	-	-	1	tr
<i>Vernonia baldwinii</i>	-	-	-	-	-	-	-	-	-	3	1	0.3
<i>Viola pratincola</i>	-	-	tr	-	-	-	-	-	-	-	1	tr
number of species	13	6	10	9	10	9	9	7	8	9		
covered ground	75	75	80	85	89	74	79	79	80	85	-	80.1
open ground	25	25	20	15	11	26	21	21	20	15	-	19.9

Table 3. A list of species and their cover percentages from eight randomly selected survey plots on The Nature Conservancy prairie at the Jamerson C. McCormack Conservation Area, Holt County, Missouri, 1987. tr = less than 1 percent cover

	11	12	13	14	15	16	17	18	FREQ	AVG
<i>Amorpha canescens</i>	-	12	-	-	-	-	-	-	1	1.5
<i>Andropogon gerardii</i>	-	-	-	-	05	10	70	43	4	16.0
<i>Asclepias verticillata</i>	tr	-	tr	-	-	-	tr	-	3	tr
<i>Bouteloua curtipendula</i>	33	43	30	40	-	-	-	-	4	18.3
<i>Conyza canadensis</i>	01	-	-	-	04	-	-	-	2	00.6
<i>Cornus drummondii</i>	07	-	05	-	06	-	02	06	5	03.3
<i>Dalea purpurea</i>	-	10	-	-	-	03	-	tr	3	01.6
<i>Liatris punctata</i>	02	-	-	-	-	-	-	-	1	00.3
<i>Linum sulcatum</i>	-	02	-	-	-	-	-	-	1	00.3
<i>Melilotus officinale</i>	02	10	04	-	75	60	-	01	6	19.0
<i>Quercus rubra</i>	-	-	03	-	-	-	-	-	1	00.4
<i>Rhus glabra</i>	-	-	-	-	02	-	-	-	1	00.3
<i>Schizachyrium scoparium</i>	33	07	15	45	01	10	-	-	6	15.1
<i>Sorghastrum nutans</i>	20	-	25	-	02	-	20	40	5	13.4
open ground	04	03	20	12	05	17	06	10		09.6

Table 4. New species to the Loess Hills landform (Novacek et al., 1985) from the Jamerson C. McCormack Conservation Area, Holt County, Missouri, 1987.

<i>Aster drummondii</i>	<i>Lobelia spicata</i> var. <i>leptostachya</i>
<i>Aster praealtus</i>	<i>Lobelia spicata</i> var. <i>spicata</i>
<i>Bidens aristosa</i>	<i>Panicum lanuginosum</i>
<i>Buglossoides arvense</i>	<i>Phlox paniculata</i>
<i>Carex albicans</i> var. <i>albicans</i>	<i>Prunus hortulana</i>
<i>Dalea candida</i>	<i>Spiranthes cernua</i>
<i>Digitaria cognata</i>	<i>Torilis arvensis</i>
<i>Erigeron pulchellus</i>	<i>Tradescantia ohiensis</i>
<i>Geranium carolinianum</i>	<i>Triodanis perfoliata</i>
<i>Hypericum punctatum</i>	<i>Viola rafinesquii</i>
<i>Leonurus marrubiastrum</i>	<i>Viola triloba</i>
	<i>Woodsia obtusa</i>

Five state-listed Missouri species were confirmed to still occur in the area. These were *Lygodesmia juncea*, *Dalea enneandra*, *Yucca glauca* var. *glauca*, *Astragalus lotiflorus*, and *Castilleja sessiliflora*. *Yucca glauca* var. *glauca* is reported for the first time from the area. *Anemone cylindrica*, a rare species, was also found. And finally, *Leonurus marrubiastrum*, a new addition to flora of Missouri was found growing at the edge of the lowland forest (Castaner and Priesendorf, 1988). Comparison with Steyermark's (1963) distributional maps indicated 53 new county records were present. The study also added 32 additional species to the Loess Hills Landform flora list of Novacek et al. (1985) (Table 4).

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APPENDIX

Vascular Flora of Jamerson C. McCormack Wildlife Area. Nomenclature follows that of Yatskievych and Turner (1990). The number of species found in a family is in brackets after the family name. An asterisk (*) indicates a county record. Two asterisks (**) indicate a state record. A dot (•) indicates a species not native to Missouri. Voucher specimens are listed last, and are housed at Central Missouri State University (WARM).

DIVISION PTERIDOPHYTA
ADIANTACEAE [1]

Adiantum pedatum L. var. *pedatum*, maidenhair fern, woodlands, common,
Priesendorf 762

DRYOPTERIDACEAE [2]

Cystopteris protrusa (Weatherby) Blasdel, fragile fern, common, *Priesendorf*
636

**Woodsia obtusa* (Spreng.) Torr., blunt-lobed woodsia, woodlands, common,
Priesendorf 763, 765

EQUISETACEAE [2]

Equisetum arvense L., field horsetail, MDC prairie depression, uncommon,
visual record only

**Equisetum laevigatum* A. Br., smooth scouring rush, prairie, incidental,
Priesendorf 804

OPHIOGLOSSACEAE [1]

Botrychium virginianum (L.) Sw. var. *virginianum*, rattlesnake fern, wood-
lands near open edge, common, *Priesendorf* 622, 699

DIVISION PINOPHYTA
CUPRESSACEAE [1]

Juniperus virginiana L. var. *virginiana*, red cedar, woodland edge and wood-
lands, common, *Priesendorf* 685, 878

DIVISION MAGNOLIOPHYTA
ACANTHACEAE [1]

Ruellia humilis Nutt. var. *longiflora* (A. Gray) Fern., wild petunia, open areas, common, *Priesendorf* 358

ACERACEAE [1]

Acer negundo L. var. *negundo*, box elder, varied habitats from wooded slopes to open fields, common, *Priesendorf* 789, 1012

AGAVACEAE [1]

Yucca glauca Nutt. var. *glauca*, soapweed, prairie, uncommon, photo record only

ANACARDIACEAE [2]

Rhus glabra L., smooth sumac, old fields and prairies, very common, *Priesendorf* 286

Toxicodendron radicans (L.) O. Kuntze ssp. *pubens* (Engelm.) Gillis, poison ivy, woodland edge and exposed areas, common, *Priesendorf* 833

ANNONACEAE [1]

Asimina triloba (L.) Dunal, paw paw, lowland forest as subcanopy tree, common, *Priesendorf* 1073

APIACEAE [4]

Cryptotaenia canadensis (L.) DC., honewort, woodlands, common, *Priesendorf* 550

Osmorhiza longistylis (Torr.) DC., sweet Cicely, woodlands and disturbed open areas, common, *Priesendorf* 700

Sanicula odorata (Raf.) Pryer & Phillippe, black snakeroot, woodlands, common, *Priesendorf* 740, 702

•**Torilis arvensis* (Huds.) Link, hedge parsley, woods and disturbed open areas, common, *Priesendorf* 445

APOCYNACEAE [1]

Apocynum cannabinum L. var. *cannabinum*, Indian hemp, woodland openings and disturbed areas, locally common, *Priesendorf* 770

**Apocynum cannabinum* L. var. *pubescens* (Mitchell) A. DC., Indian hemp, woodland openings and disturbed areas, locally common, *Priesendorf* 413

ARACEAE [1]

Arisaema triphyllum (L.) Schott, Jack-in-the-pulpit, forest bottoms, occasional, Priesendorf 709

ASCLEPIADACEAE [3]

Asclepias syriaca L., common milkweed, open areas, common, Priesendorf 1118

Asclepias verticillata L., whorled milkweed, open areas, common, Priesendorf 901, 982

Asclepias viridiflora Raf., green milkweed, wooded areas, common, Priesendorf 453

ASTERACEAE [43]

Ambrosia artemisiifolia L. var. *elatior* (L.) Desc., common ragweed, old fields, common, Priesendorf 1016

Ambrosia psilostachya DC., western ragweed, disturbed open areas and prairie, common, Priesendorf 994

Ambrosia trifida L., horseweed, lowland woods, common, Priesendorf 974

Aster drummondii Lindl., Drummond aster, woods, fields, and prairie, common, Priesendorf 602, 1043

Aster ericoides L., wreath aster, prairie, common, Priesendorf 592

**Aster oolentangiensis* Ridd., azure aster, prairie, common, Priesendorf 1061

**Aster prealtus* Poir. var. *subasper* (Lindl.) Wieg., willow-leaved aster, prairie, common, Priesendorf 535

Aster sericeus Vent., silky aster, prairie, occasional - Priesendorf 590, 591

Bidens aristosa (Michx.) Britton, tickseed sunflower, low woods, common, Priesendorf 586

Brickellia eupatorioides (L.) Shinn., false boneset, open disturbed areas and prairie, common, Priesendorf 512, 1026

Cacalia atriplicifolia L., pale indian plantain, open upland woods, common, Priesendorf 906

•*Carduus nutans* L., musk thistle, disturbed open areas, common, Priesendorf 818

Cirsium altissimum (L.) Spreng., tall thistle, disturbed prairie, common, Priesendorf 556, 557

Conyza canadensis (L.) Cronq., horseweed, open fields, common, Priesendorf 919

Erechtites hieracifolia (L.) Raf. var. *hieracifolia*, fireweed, woods, common, Priesendorf 1120

Erigeron annuus (L.) Pers. var. *annuus* (L.) Pers., daisy fleabane, woods and old fields, common, Priesendorf 647, 1057

**Erigeron pulchellus* Michx. var. *pulchellus*, Robin's plantain, bottomland forest, occasional, Priesendorf 712

- Erigeron strigosus* Muhl. var. *strigosus*, daisy fleabane, woods and prairie, common, Priesendorf 678, 1050
- Eupatorium altissimum* L., tall thoroughwort, disturbed open, common, Priesendorf 601
- Eupatorium purpureum* L., green-stemmed Joe-Pye weed, ow woods, common, Priesendorf 583
- **Eupatorium rugosum* Houtt. var. *rugosum*, white snakeroot, open areas, common, Priesendorf 600, 968
- **Gnaphalium obtusifolium* L. var. *obtusifolium*, sweet everlasting, old fields, common, Priesendorf 1009
- Helianthus hirsutus* Raf., woodland sunflower, disturbed open areas, common, Priesendorf 496
- **Helianthus petiolaris* Nutt., prairie sunflower, field and disturbed prairie, common, Priesendorf 564, 1013
- Lactuca floridana* (L.) Gaertn. var. *floridana*, wild lettuce, woodlands and edge of woods, common, Priesendorf 580
- Lactuca serriola*, prickly lettuce, disturbed areas, common, Priesendorf 459
- Liatris aspera* Michx., blazing star, prairie, common, Priesendorf 528, 562
- Liatris punctata* Hook. var. *nebraskana* Gaiser, snakeroot, prairie, common, Priesendorf 536, 1030
- Lygodesmia juncea* (Pursh) D. Don, skeleton weed, prairie, occasional, photo record only
- Ratibida pinnata* (Vent.) Barnh., gray-headed coneflower, old fields, common, Priesendorf 808
- Rudbeckia hirta* L., black-eyed Susan, disturbed open areas, common, Priesendorf 752
- **Senecio plattensis* Nutt., prairie ragwort, prairie, occasional, Priesendorf 674, 679
- Silphium integrifolium* Michx. var. *integrifolium*, rosin weed, lowland woods, prairie, and disturbed open areas, common, Priesendorf 588, 1036
- Silphium integrifolium* Michx. var. *laeve* Torr. & A. Gray, rosin weed, open areas, common, Priesendorf 905, 452
- Solidago altissima* L. var. *altissima*, tall goldenrod, low woods and old fields, common, Priesendorf 574
- **Solidago altissima* L. var. *gilvocanescens* Rydb., goldenrod, old fields, common, Priesendorf 599
- Solidago missouriensis* Nutt., goldenrod, prairie woodland edge, common, Priesendorf 950, 1033
- Solidago nemoralis* var. *longipetiolata* (Mackenzie & Bush) E.J. Palmer, old-field goldenrod, common, disturbed prairie, Priesendorf 563
- Solidago rigida* L. ssp. *rigida*, stiff goldenrod, prairie, common, Priesendorf 558, 945
- Solidago ulmifolia* Muhl. var. *ulmifolia*, elm-leaved goldenrod, prairie, common, Priesendorf 589

- *Taraxacum officinale* Weber, common dandelion, disturbed open areas, common, *Priesendorf* 332
- *Tragopogon dubius* Scop., goat's beard, disturbed open areas, common, *Priesendorf* 334
- Verbesina alternifolia* (L.) Britt., yellow ironweed, low woods and disturbed open areas, common, *Priesendorf* 962
- * *Vernonia baldwinii* Torr. ssp. *baldwinii*, ironweed, prairie, common, *Priesendorf* 958
- * *Vernonia baldwinii* Torr. ssp. *interior* (Small) Faust, ironweed, disturbed open area, common, *Priesendorf* 821

BALSAMINACEAE [1]

- Impatiens capensis* Meerb., spotted-touch-me-not, low woodlands, occasional, *Priesendorf* 1046

BERBERIDACEAE [1]

- Podophyllum peltatum* L., May apple, lowland woods, common, *Priesendorf* 710

BETULACEAE [2]

- Corylus americana* Walt., hazelnut, woodlands, common, *Priesendorf* 760
- Ostrya virginiana* (Mill.) K. Koch var. *lasia* Fern., hop hornbeam, woodlands, common, *Castaner & Priesendorf* 9545

BIGNONIACEAE [1]

- Campsis radicans* (L.) Seem., trumpet creeper, woodland edge, common, *Priesendorf* 1054

BORAGINACEAE [4]

- Hackelia virginiana* (L.) I.M. Johnston, beggar's lice, woodlands, common, *Priesendorf* 882
- Lithospermum canescens* (Michx.) Lehm., hoary puccoon, prairie openings, occasional, *Priesendorf* 1085
- * *Lithospermum caroliniense* (Walt.) MacMillan, plains puccoon, prairie openings, occasional, *Priesendorf* 326
- Lithospermum incisum* Lehm., yellow puccoon, prairie openings, occasional, *Priesendorf* 362, 1084

BRASSICACEAE [5]

- Arabis canadensis* L., sicklepod, woodlands, common, *Priesendorf* 667
- Descurainia pinnata* ssp. *brachycarpa* (Richards.) Detl., tansy mustard, lowland woods and disturbed open areas, common, *Priesendorf* 645
- **Draba reptans* (Lam.) Fern., whitlow grass, disturbed open, common, *Castaner* 9548
- Lepidium virginicum* L. var. *virginicum*, pepper grass, disturbed open areas, common, *Priesendorf* 754
- Thlaspi arvense* L., field pennycress, disturbed areas, common, *Priesendorf* 292

CAESALPINIACEAE [4]

- Cercis canadensis* L. var. *canadensis*, rRedbud, edge and woodlands, common, *Priesendorf* 375
- Chamaecrista fasciculata* (Michx.) E. Greene, showy partridge pea, disturbed open areas and woodland edge, common, *Priesendorf* 988
- Gleditsia triacanthos* L., honey locust, woodlands, common, *Priesendorf* 940, 1041
- Gymnocladus dioica* Lam., Kentucky coffee tree, disturbed woods, common, *Priesendorf* 1039

CAMPANULACEAE [4]

- Campanula americana* L., tall bellflower, low woods, common, *Priesendorf* 837
- Lobelia siphilitica* L. var. *siphilitica*, blue Cardinal Flower, low forest, common, *Priesendorf* 582
- **Lobelia spicata* Lam. var. *leptostachys* (A. DC.) Mackenzie & Bush, lobelia, exposed areas, common, *Priesendorf* 720
- Lobelia spicata* Lam. var. *spicata*, spiked lobelia, exposed areas, common, *Priesendorf* 416
- **Triodanis perfoliata* (L.) Nieuwl., Venus' looking glass, open disturbed areas, occasional, *Priesendorf* 650

CANNABACEAE [2]

- Cannabis sativa* L., hemp, disturbed open area, occasional, *Priesendorf* 1006
- Humulus lupulus* L., hops, edge of woods, incidental, *Priesendorf* 920

CAPRIFOLIACEAE [3]

- Sambucus canadensis* L. var. *canadensis*, common elderberry, disturbed open areas, occasional, *Priesendorf* 725

Symphoricarpos orbiculatus Moench, coral berry, edge of woods, occasional,
Priesendorf 937

Triosteum perfoliatum L., common horse gentian, varied habitats from open
areas to woods, common, Priesendorf 304

CARYOPHYLLACEAE [4]

**Cerastium nutans* Raf., nodding chickweed, disturbed areas, occasional,
Priesendorf 331

•*Dianthus armeria* L., Deptford pink, exposed open areas, common,
Priesendorf 311

Saponaria officinalis L., bouncing bet, open areas, occasional,- Priesendorf
1063

Silene antirrhina L., sleepy catchfly, disturbed open areas, incidental,
Priesendorf 323

CELASTRACEAE [1]

Celastrus scandens L., American bittersweet, edge of woods, common,
Priesendorf 623

CHENOPODIACEAE [3]

•*Chenopodium album* L. var. *lanceolatum* (Muhl. ex Willd.) Cosson &
Germ., lamb's quarters, disturbed open areas, common, Priesendorf 569

Chenopodium simplex (Torrey) Raf., maple-leaved goosefoot, disturbed open
areas and edge of woods, occasional, Priesendorf 486

**Chenopodium standleyanum* Aellen, goosefoot, disturbed open area,
occasional, Priesendorf 932

CLUSIACEAE [1]

Hypericum punctatum L., common St.-John's wort, woodlands, common,
Priesendorf 946

COMMELINACEAE [2]

•*Commelina communis* L., dayflower, low moist woods, common, Priesendorf
479

Tradescantia ohiensis Raf., piderwort, Low woods, common, Priesendorf 1059

CORNACEAE [1]

Cornus drummondii Meyer, rough-leaved dogwood, woodland edge and open
areas, very common, Priesendorf 285

CUCURBITACEAE [1]

Sicyos angulatus L., bur cucumber, disturbed areas, common, *Priesendorf* 578

CYPERACEAE [6]

**Carex albicans* Willd. ex. Sprengel. var. *albicans*, sedge, woodland edge, common, *Castaner & Priesendorf* 9542 9544

**Carex amphibola* Steud., sedge, prairie, *Priesendorf* 803

Carex blanda Dewey, sedge, dry to moist woodlands and prairie, common, *Priesendorf* 634

Carex brevior (Dewey) Mackenzie, sedge, open areas, common, *Priesendorf* 662, 703

**Carex oligocarpa* Schkuhr., sedge, low woods, *Priesendorf* 694

Carex radiata (Wahlenberg) Small, sedge, low woods,- *Priesendorf* 690

EUPHORBIACEAE [7]

Acalypha rhomboidea Raf., three-seeded mercury, low woods, common, *Priesendorf* 478

Chamaesyce glyptosperma (Engelm.) Small, spurge, disturbed open areas, *Priesendorf* 911

Chamaesyce nutans (Lag.) Small, nodding spurge, disturbed open areas and edge of woods, common, *Priesendorf* 928

Euphorbia corollata L., flowering spurge, woodland trail, common, *Priesendorf* 863

•*Euphorbia cyathophora* Murray, fire-on-the-mountain, disturbed prairie, common, *Priesendorf* 560, 925

Euphorbia dentata Michx., spurge, disturbed prairie and woodland edge, common, *Priesendorf* 561, 929

Euphorbia marginata Pursh., snow-on-the-mountain, prairie and disturbed prairie, common, *Priesendorf* 730

FABACEAE [20]

Amorpha canescens Pursh., lead plant, prairie, common, *Priesendorf* 352, 828

**Amphicarpaea bracteata* (L.) Fern., hog peanut, woodland edge, common, *Priesendorf* 570

**Astragalus crassicaarpus* Nutt., ground plum, prairie, occasional, *Priesendorf* 776

Astragalus lotiflorus Hook., low milk vetch, prairie, incidental, *Priesendorf* 1082

Dalea candida Michx. ex. Willd., white prairie clover, disturbed open areas, common, *Priesendorf* 446

- Dalea enneandra* Nutt., nine-anther prairie clover, prairie, occasional, Priesendorf 463
- Dalea purpurea* Vent. var. *purpurea*, purple prairie clover, prairie, common, Priesendorf 827, 889
- Desmodium canadense* (L.) DC., tick trefoil, disturbed open, common, Priesendorf 1017
- Desmodium glutinosum* (Muhl.) A.W. Wood, tick trefoil, disturbed open areas, common, Priesendorf 423
- Desmodium paniculatum* (L.) DC., tick trefoil, woodlands and open areas, common, Priesendorf 552
- *Kummerowia stipulacea* (Maxim.) Makino, Korean lespedeza, disturbed open areas, common, Priesendorf 1004
- Lespedeza capitata* Michx., prairie bush clover, disturbed open areas and prairie, common, Priesendorf 518, 987
- **Lespedeza cuneata* (Dumont.) G. Don, sericea lespedeza, disturbed open areas and woodland edge, common, Priesendorf 981
 - *Medicago lupulina* L., black medic, disturbed open areas, common, Priesendorf 648
 - *Medicago sativa* L. ssp. *sativa*, alfalfa, disturbed open areas, common, Priesendorf 772
 - *Melilotus albus* Medikus, white sweet clover, disturbed open areas, common, Priesendorf 349, 724
 - *Melilotus officinale* (L.) Pallas, yellow sweet clover, disturbed open areas, common, Priesendorf 767
- Pedimelum argophyllum* (Pursh.) J. Grimes, silvery psoralea, prairie, uncommon, Priesendorf 733
- Robinia pseudo-acacia* L., black locust, prairie edge and low woods, common, Priesendorf 1029
- *Trifolium pratense* L. var. *sativum* Schreb., red clover, disturbed open areas, common, Priesendorf 502

FAGACEAE [4]

- **Quercus macrocarpa* Michx., bur oak, open areas, common, Priesendorf 306, 908
- Quercus prinoides* Willd., chestnut oak, prairie, common, Priesendorf 298, 705
- Quercus rubra* L. var. *ambigua* (A. Gray) Fern., red oak, prairie edge and upland forest, common, Priesendorf 831, 960
- **Quercus velutina* Lam., black oak, disturbed open areas, common, Priesendorf 955, 989

FUMARIACEAE [2]

- Corydalis micrantha* (Engelm.) A. Gray, small-flowered corydalis, disturbed open areas, common, Castaner & Priesendorf 9551, 9547

Dicentra cucullaria (L.) Bernh., Dutchman's breeches, low woods, common, Priesendorf 1075

GERANIACEAE [1]

Geranium carolinianum L., cranesbill, disturbed open areas, common, Priesendorf 651

GROSSULARIACEAE [1]

Ribes missouriense Nutt. ex Torrey & A. Gray, Missouri gooseberry, woodlands, common, Priesendorf 1072

HYDROPHYLLACEAE [1]

Ellisia nyctelea L., aunt Lucy, low woods, common, Priesendorf 687

IRIDACEAE [1]

Sisyrinchium campestre Bickn., prairie blue-eyed grass, prairie, occasional, Priesendorf 673, 1087

JUGLANDACEAE [3]

Carya cordiformis (Wangenh.) K. Koch, bitternut hickory, prairie edge and forest, common, Priesendorf 961

Carya ovata (Mill.) K. Koch, shagbark hickory, prairie edge and woodland, common, Priesendorf 976

Juglans nigra L., black walnut, woodlands, common, Priesendorf 381

LAMIACEAE [7]

**Agastache scrophulariifolia* (Willd.) Kuntze, purple-giant hyssop, disturbed open areas, common, Priesendorf 566

**Hedeoma hispidum* Pursh., mock pennyroyal, disturbed open areas, common, Priesendorf 353, 751

•*Leonurus cardiaca* L., motherwort, woodland trail, common, Priesendorf 325, 778A

•*Leonurus marrubiastrum* L., biennial motherwort, woodland trail, occasional, Priesendorf 466, 847

Monarda fistulosa L. ssp. *fistulosa*, wild bergamot, disturbed open areas, common, Priesendorf 819

**Pycnanthemum tenuifolium* Schrad., slender mountain mint, open, common, Priesendorf 1053

Teucrium canadense L. var. *canadense*, wood sage, disturbed areas, common,
Priesendorf 534

LILIACEAE [2]

Erythronium albidum Nutt., white dog-tooth violet, low woods, common,
Priesendorf 1078

**Polygonatum biflorum* (Walt.) Ell. var. *biflorum*, Solomon's seal, low
woodlands, common, *Priesendorf* 666

LINACEAE [1]

**Linum sulcatum* Riddell, flax, prairie, occasional, *Priesendorf* 365, 732

MENISPERMACEAE [1]

Menispermum canadense L., moonseed, woodlands, common, *Priesendorf* 741

MIMOSACEAE [1]

Desmanthus illinoensis (Michx.) MacMillan, prairie mimosa, open areas,
common, *Priesendorf* 419, 532

MORACEAE [3]

•*Maclura pomifera* (Raf.) Schneid., Osage orange, woods edge, occasional,
Priesendorf 941

•*Morus alba* L., white mulberry, woodlands and some disturbed open areas,
common, *Priesendorf* 376, 851

Morus rubra L., red mulberry, woodlands and prairie edge, common,
Priesendorf 369, 978

OLEACEAE [2]

Fraxinus americana L., white ash, woodland and edge of woods, common,
Priesendorf 971

Fraxinus pennsylvanica Marsh., green ash, disturbed woodlands, common,
Priesendorf 948

ONAGRACEAE [5]

Calylophus serrulatus (Nutt.) Raven, plains yellow primrose, prairie, common,
Priesendorf 676

Circaea lutetiana L. ssp. *canadensis* (L.) Asch & Magnus, enchanter's
nightshade, woodlands; primarily low woodlands, common, *Priesendorf*
794

Gaura longiflora Spach, biennial gaura, disturbed open areas, common, Priesendorf 1020, 1044

Gaura parviflora Douglas, velvety gaura, disturbed open areas, common, Priesendorf 883

**Oenothera biennis* L., common evening primrose, woodlands and open areas, common, Priesendorf 986, 1019

ORCHIDACEAE [1]

**Spiranthes cernua* (L.) Richard var. *cernua*, common ladies' tresses, prairie and fields, common, Priesendorf 593, 996

OXALIDACEAE [1]

Oxalis stricta L., yellow wood sorrel, low woodlands, common, Priesendorf 481

PHYTOLACCACEAE [1]

Phytolacca americana L., pokeweed, disturbed open areas and edge of woods, occasional, Priesendorf 917

PLANTAGINACEAE [3]

**Plantago aristata* Michx., bracted plantain, disturbed open, common, Priesendorf 1060

Plantago rugelii Decne., Rugel plantain, disturbed open areas and low woods, common, Priesendorf 434

Plantago virginica L., hoary plantain, disturbed open areas, common, Priesendorf 746

POACEAE [30]

Andropogon gerardii Vitman, big bluestem, prairie and disturbed open areas, common, Priesendorf 524, 993

Bouteloua curtipendula (Michx.) Torr., sideoats grama, prairie ridges at the crest, common, Priesendorf 391, 414

Bouteloua hirsuta Lag., hairy grama, prairie, occasional, Priesendorf 519, 899

•*Bromus inermis* Leyss, smooth brome, disturbed open areas, common, Priesendorf 775

•**Bromus japonicus* Thunb., Japanese brome, old fields, common, Priesendorf 755

•*Bromus tectorum* L. var. *tectorum*, downy brome, old fields, common, Priesendorf 656

- Dactylis glomerata* L. var. *glomerata*, orchard grass, disturbed open areas, common,, *Priesendorf* 319
- **Dichanthelium acuminatum* (Sw.) Gould & C.A. Clark var. *acuminatum*, panic grass, disturbed open areas, common, *Priesendorf* 743
- **Dichanthelium oligosanthes* (Schultes) Gould var. *scribnerianum* (Nash), panic grass, disturbed open areas and woods, common, *Priesendorf* 354, 665
- **Digitaria cognata* (Schultes) Pilger, fall witchgrass, disturbed open areas, common, *Priesendorf* 472
- Digitaria sanguinalis* (L.) Scop., crab grass, disturbed open areas, common, *Priesendorf* 467
- Elymus canadensis* L. var. *canadensis*, wild rye, disturbed open areas and prairie, common, *Priesendorf* 453, 780
- Eragrostis pectinacea* (Michx.) Nees, Carolina love grass, disturbed woods, common, *Priesendorf* 433,
- Eragrostis spectabilis* (Pursh.) Steud. purple love grass, disturbed open areas, common, *Priesendorf* 896,
- **Festuca pratensis* Huds., meadow fescue, disturbed open areas, common, *Priesendorf* 644
- Festuca subverticillata* (Pers.) E. Aleks., nodding fescue, disturbed open areas, common, *Priesendorf* 646, 768
- Hordeum pusillum* Nutt., little barley, disturbed open areas and prairie edge, occasional, *Priesendorf* 360
- Leersia virginica* Willd., white grass, low woods, common, *Priesendorf* 470
- Muhlenbergia cuspidata* (Torr.) Muhl., plains muhly, prairie, common, *Priesendorf* 523
- Muhlenbergia racemosa* (Michx.) Britton, Sterns, & Poggenb., muhly, disturbed open areas and prairie, common, *Priesendorf* 916
- Muhlenbergia schreberi* Gmel., nimblewill, woodlands, occasional, *Priesendorf* 1115
- Panicum capillare* L. var. *capillare*, witch grass, prairie, common, *Priesendorf* 526
- Phleum pratense* L., Timothy, disturbed open areas, common, *Priesendorf* 756
- Poa pratensis* L., Kentucky bluegrass, disturbed open areas, common, *Priesendorf* 663
- Poa sylvestris* A. Gray, sylvan bluegrass, disturbed woods, common, *Priesendorf* 618
- Schizachyrium scoparium* (Michx.) Nash, little bluestem, prairie ridges along crests, common, *Priesendorf* 499
- Setaria pumila* (Poirot) Roemer & Schultes, yellow foxtail, disturbed open areas, common, *Priesendorf* 438, 992
- Sorghastrum nutans* (L.) Nash, Indian grass, prairie and disturbed open areas, common, *Priesendorf* 990
- Sphenopholis obtusata* (Michx.) Scribn. var. *obtusata*, wedge grass, upland woods, common, *Priesendorf* 318, 691

Tridens flavus (L.) Hitch., purpletop, disturbed open areas, common,
Priesendorf 577, 914

POLEMONIACEAE [2]

Phlox divaricata L. ssp. *laphamii* A.W. Wood, blue phlox, low moist woods,
common, *Priesendorf* 614, 1071

Phlox paniculata L., perennial phlox, low moist woods, occasional,
Priesendorf 576

POLYGONACEAE [4]

**Polygonum punctatum* Ell. var. *punctatum*, water smart weed, prairie edge,
common, *Priesendorf* 585, 964

Polygonum scandens L., false buckwheat, low moist woods, common,
Priesendorf 584

Polygonum virginianum L. var. *virginianum*, Virginia knotweed, woodlands,
common, *Priesendorf* 581, 549

•*Rumex crispus* L., sour dock, disturbed open areas, common, *Priesendorf*
388, 389

RANUNCULACEAE [6]

Actaea pachypoda Ell., white baneberry, woodlands, occasional, *Priesendorf*
1047

Anemone cylindrica A. Gray, thimbleweed, prairie edges, common, photo
record only

Anemone virginiana L., thimbleweed, disturbed open and woodlands,
common, *Priesendorf* 565, 814

Aquilegia canadensis L., columbine, woodlands, common, *Priesendorf* 665,
789

Delphinium carolinianum Walter ssp. *penardii* (Huth) M. Warnock, prairie
larkspur, prairie, common, *Priesendorf* 363, 727

Ranunculus abortivus L., small-flowered crowfoot, low woods, common,
Priesendorf 1067

RHAMNACEAE [1]

Ceanothus herbaceus Raf. var. *pubescens* (Torr. & A. Gray) Shinn., redroot,
prairie, common, *Priesendorf* 301

ROSACEAE [8]

Amelanchier arborea (Michx. f.) Fern., service berry, woodlands, occasional,
Castaner 9546

- Geum canadense* Jacq., white avens, woodlands, common, *Priesendorf* 541, 796
- Potentilla recta* L., rough-fruited cinquefoil, disturbed open areas, common *Priesendorf* 1058
- **Prunus hortulana* L.H. Bailey, wild goose plum, woodland edge, occasional, *Priesendorf* 980
- Prunus serotina* Ehrh., black cherry, woodlands, common, *Priesendorf* 1038
- Prunus virginiana* L. var. *virginiana*, choke cherry, dry woods, common, *Priesendorf* 877, 1083
- **Rosa setigera* Michx. var. *setigera*, prairie rose, disturbed open areas, common, *Priesendorf* 785
- Rubus occidentalis* L., black raspberry, disturbed areas, common, *Priesendorf* 340, 719

RUBIACEAE [4]

- Galium aparine* L., cleavers, disturbed open areas, common, *Priesendorf* 652
- Galium circaezans* Michx. var. *hypomalicum* Fern., wild licorice, woodlands, disturbed open areas and prairie, common, *Priesendorf* 664
- Galium triflorum* Michx., sweet-scented bedstraw, disturbed open areas and woodlands, common, *Priesendorf* 493
- Hedyotis nigricans* (Lam.) Fosc., narrowleaved bluets, prairie, common, *Priesendorf* 857

RUTACEAE [1]

- Zanthoxylum americanum* Mill., prickly ash, woodlands, occasional, *Priesendorf* 1045

SALICACEAE [3]

- **Populus alba* L., silver poplar, low woods, incidental, *Priesendorf* 289
- Populus deltoides* Marsh., cottonwood, disturbed open areas and woods, common, *Priesendorf* 835
- Salix humilis* Marsh. var. *humilis*, prairie willow, prairie, common, *Priesendorf* 953, 1081

SANTALACEAE [1]

- Comandra umbellata* (L.) Nutt. ssp. *umbellata*, bastard toadflax, disturbed open areas and prairie, common, *Priesendorf* 737

SCROPHULARIACEAE [6]

- Agalinis aspera* (Dougl. ex. Benth.) Britton, rough gerardia, prairie, common, *Priesendorf* 559, 1032

Castilleja sessiliflora Pursh., downy painted cup, prairie, uncommon, photo record only

Scrophularia marilandica, figwort, woodlands, common, Priesendorf 880

• *Veronica arvensis* L., corn speedwell, woodlands, uncommon, Priesendorf 627

Veronica peregrina L. var. *peregrina*, neckweed, low woods, common, Priesendorf 330

• *Verbascum thapsus* L., mullein, disturbed open areas common, Priesendorf 797

SMILACACEAE [1]

Smilax hispida Muhl., bristly greenbrier, woodland edge, common, Priesendorf 845, 706

SOLANACEAE [3]

Physalis heterophylla Nees. var. *heterophylla*, ground cherry, disturbed open areas, common, Priesendorf 840

* *Physalis virginiana* Mill., ground cherry, disturbed open areas, common, Priesendorf 659

Solanum carolinense L. var. *carolinense*, horsenettle, disturbed open areas, common, Priesendorf 1051

TILIACEAE [1]

Tilia americana L., basswood, lowland forest, common, Priesendorf 1116

ULMACEAE [3]

Celtis occidentalis L., hackberry, woodlands, common, Priesendorf 871

• *Ulmus pumila* L., Siberian elm, disturbed woods, common, Priesendorf 1042

Ulmus rubra Muhl., slippery elm, woodlands, common, Priesendorf 334, 939

URTICACEAE [4]

Laportea canadensis (L.) Gaud., wood nettle, Disturbed open areas, common, Priesendorf 489

Parietaria pensylvanica Muhl. ex Willd. var. *pensylvanica*, pellitory, low woods, common, Priesendorf 396

Pilea pumila (L.) A. Gray, clearweed, low woods, common, Priesendorf 966

Urtica dioica L. ssp. *gracilis* (Aiton) Selander, tall nettle, woodland trail, common, Priesendorf 482, 865

VERBENACEAE [3]

Phryma leptostachya L. var. *leptostachya*, lopseed, low woodlands, common, Priesendorf 401

Verbena stricta Vent., vervain, disturbed open areas, common, Priesendorf 824

Verbena urticifolia L. var. *urticifolia*, white vervain, woodlands, common, Priesendorf 879

VIOLACEAE [5]

**Viola pratensis* Greene, blue prairie violet, prairie, occasional, Castaner & Priesendorf 9543

Viola pubescens Aiton var. *eriocarpa* (Schwein.) N. Russell, smooth yellow violet, woodlands, occasional, Priesendorf 698

Viola rafinesquii Greene, field pansy, occasional, Priesendorf 1117

Viola sororia Willd., common blue violet, disturbed open areas, common, Priesendorf 1070

**Viola triloba* Schwein., three-lobed violet, woodland trail, common, Priesendorf 784

VITACEAE [3]

Parthenocissus quinquefolia (L.) Planch. var. *quinquefolia*, Virginia creeper, woodlands, common, Priesendorf 886

Vitis riparia Michx. var. *riparia*, riverbank grape, woodland edge, common, Priesendorf 461

Vitis vulpina L., winter grape, disturbed open areas and woods, common, Priesendorf 710, 836

ANNOUNCEMENT

Copies of plant lists and other information relating to the flora are requested for inclusion in the Society's flora file. Please send items to the archivist, Jim Bogler (see address on inside front cover).

UTRICULARIA SUBULATA IN MISSOURI

J. M. Sullivan
124 Holy Family Church Rd.
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It was Friday, the 19th of May, 1995, the last day of our five-day adventure, and the day to head for home. But, our Botany Group (of the Webster Groves Nature Study Society) made one more stop before proceeding north. We visited Shut-In Mountain Fens, a preserve of The Nature Conservancy in Shannon County, Missouri.

Shortly after entering the easternmost of three fens, Pat Harris called attention to a minute, yellow flower. From a stand-up position the find did not seem very impressive. The corolla was very tiny, appeared to have no definite shape, and seemed to be suspended about 2-5 cm off the ground, with no visible means of support.

A much closer examination revealed that the corolla did have a distinctive shape after all, one typical of the genus *Utricularia* L., the bladderworts. The supporting stem was little more than a wiry thread rising out of the wet sand.

Although not much to look at, the plant sparked a surge of excitement in our group. The only two *Utricularia* species known in Missouri were both submerged aquatics. This one was growing on a seepage slope, well anchored in coarse sand. There was no way it could float, even part-time. It seemed likely that we had something new!

We were delighted to find several more of the plants in that fen, and even more pleased when Pat discovered the first plant of the same kind in the preserve's middle fen. We eventually found more of it in the middle and western fens than we had in the fen of the first discovery.

Karen Haller, Jack Harris, Nels Holmberg, and John Molyneaux did their best to photograph the miniscule subject in its lowly and wet situation. Nels stretched out prone on the watery ground to take his best shot. Meanwhile, Karen brought the third volume of Gleason's *New Britton and Brown Illustrated*

Flora of the Northern United States and Adjacent Canada (1968 reprint, Hafner Publishing Co., New York) and the more recent Gleason and Cronquist *Manual of Vascular Plants of Northeastern United States and Adjacent Canada* (1991, New York Botanical Garden, New York) right out on the fen for some on-site research.

After finding it in all three fens, we decided to take a single specimen for necessary documentation, both for The Nature Conservancy and for the Flora of Missouri Project. We cut out a small cylinder of the sandy marl with a pocket knife, hoping to preserve the subterranean parts, then washed most of the coarse-grained sand away in the clear-flowing sluiceways of the fen. A second, flowerless stem was discovered while cleaning the first one.

Back at the cars, we read from the introduction in Steyermark's *Flora of Missouri* (1963, Iowa State University Press, Ames), where he suggested species that future botanists might find in Missouri because of their occurrence in nearby Arkansas. One of these was *Utricularia subulata*, a terrestrial species. According to Smith's *An Atlas and Annotated List of the Vascular Plants of Arkansas* (1988, published by the author, Fayetteville), this species is most common in southeastern Arkansas, but it has also been collected in Benton County, the northwesternmost county, which is the wrong end of the state from our Missouri locality. Elsewhere, the species occurs along the Atlantic Coastal Plain of eastern North America and west to southern Texas.

Pat and Jack Harris and Betty Nellums hurried the specimen to George Yatskievych at the Missouri Botanical Garden that same day. George had been with the group earlier in the week, but returned to St. Louis late Wednesday, and thus missed the most exciting find of the trip. Using a microscope, various manuals, and other miniscule herbarium specimens, George determined conclusively that our discovery was *Utricularia subulata* L., the slender bladderwort. It is a new addition to the list of Missouri native plants.

In addition to its terrestrial growth form, *U. subulata* differs from the other two Missouri bladderwort species in several morphological features. Its vegetative stems are mostly

unbranched, with few, flattened, linear offshoots that resemble leaves, and the bladders are few and tiny. *Utricularia gibba* L. and *U. macrorhiza* LeConte both have highly branched stems with numerous, larger, and more conspicuous bladders. The few-flowered inflorescences of *U. subulata* also have a unique type of bract at the nodes. These are appressed, diamond-shaped, and peltate (attached in the middle of the lower surface). The small, yellow corollas are also unusual compared to the other Missouri species in their broad, noticeably 3-lobed lips.

As frequently happens with new discoveries, George also found that one of the Missouri specimens already in the MO herbarium was also *U. subulata*, although it had earlier been misdetermined as *U. gibba*, the humped bladderwort. This specimen had been collected by Bill Summers in 1985 in a fen on a slope of Thorny Mountain, also in Shannon County, about three airmiles from Shut-In Mountain Fens.



Fig. 1. *Utricularia subulata* in its natural habitat.
Photo by John Molyneaux.

BOOK REVIEW

George Yatskievych

Ladd, Doug. 1995. *Tallgrass Prairie Wildflowers*. Falcon Press. 262 pp. \$19.95. ISBN 1-56044-299-9. Paperbound.

The thoughtful, well-written text, together with the beautiful photography of Frank Oberle and others, makes this a must-buy for anyone with an interest in the wildflowers of the tallgrass prairie region. In some ways this book originated as an outgrowth of Oberle's earlier book of photographs, the coffee table-sized *Tallgrass Prairie*, which contained text by the late John Madsen. The present book, also with wonderful visuals, is aimed primarily at allowing users to identify common wildflower species that are important in tallgrass prairie communities ranging from Oklahoma to Ohio, and northward into Canada. The coverage of plants in a particular habitat, as opposed to the more commonly seen approach in other field guides to plants in every habitat of a particular region, allows for relatively greater completeness in the Ladd and Oberle book than in most other guides.

The book contains information on 295 species arranged by flower color, complete with descriptions, photographs, and some line drawings. Also included is a section on selected grasses, sedges, and rushes. Not included are any of the introduced species, some of which are common in disturbed prairies. A lengthy introduction to different tallgrass prairie habitats sets the stage for discussions of habitat and range for the included plants. The species accounts also cover scientific and common names, seasons of bloom, and occasional discussions of related species. An introductory section on how to use the book also contains illustrations of plant structures, and there is an illustrated glossary toward the volume's end. A map of tallgrass prairies and related vegetation helps to orient the user, and the book is rounded out with a section on prairie management, as well as lists of places to see prairies in various states and a bibliography of books for further reading.

The text shows the author's great experience with these plants and their ecology. The photographs pack a lot of information and complement the text very well. Knowing the prairie flora of Missouri, I was surprised at all of the species that inhabit prairies elsewhere, and the book fueled my excitement to visit them in other states. Many of the tidbits thrown into the comments section of each species treatment were amusing and educational. There is a lot more to be learned here than merely what the plants look like!

There are numerous reasons to buy this book, not the least of which is that a portion of the proceeds go to The Nature Conservancy. Many of these species are worthy of cultivation in gardens, and the book provides valuable habitat information. Others are in urgent need of conservation, and the book distinguishes these from more common look-alikes. Finally the book provides excellent insights into how these species fit together into a mosaic of different prairie and savanna communities. Ladd and Oberle are to be congratulated on completing an attractive, useful, and inspiring volume, well worth the price.